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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/705,409	11/10/2003	William M. Hiatt	2269-5558D US (99-0253.03)	3302
24247	7590	11/01/2005	EXAMINER	
TRASK BRITT P.O. BOX 2550 SALT LAKE CITY, UT 84110			KOSOWSKI, ALEXANDER J	
			ART UNIT	PAPER NUMBER
			2125	

DATE MAILED: 11/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/705,409

Applicant(s)

HIATT ET AL.

Examiner

Alexander J. Kosowski

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE \_\_\_\_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 May 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-63 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13, 17-45, 50, 51 and 54-63 is/are rejected.
- 7) ☒ Claim(s) 14-16, 46-49, 52 and 53 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 May 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 3/7/05.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

### **DETAILED ACTION**

- 1) Claims 1-63 are presented for examination.

#### ***Allowable Subject Matter***

- 2) Claims 14-16, 46-49 and 52-53 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

#### ***Claim Rejections - 35 USC § 102***

- 3) The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

- 4) Claims 1, 3-9, 35-36 and 43 are rejected under 35 U.S.C. 102(e) as being unpatentable by Tischler (U.S. PGPUB 2003/0114016).

Referring to claim 1, Tischler teaches a programmable material consolidation apparatus, comprising: a retention system including a support surface for supporting at least one substrate on or adjacent to which one or more objects are to be formed and configured to prevent lateral movement of the at least one substrate (Paragraph 0032 and Paragraph 0039 and Paragraph 0065, whereby a dimensionally close-fit recess prevents lateral movement).

Referring to claim 3, Tischler teaches that the retention system includes at least one raised element around at least a portion of a periphery of the support surface (Paragraph 0077 and Figure 4).

Referring to claim 4, Tischler teaches that the at least one raised element is configured to prevent lateral movement of the at least one substrate (Paragraph 0077 and Figure 4).

Referring to claim 5, Tischler teaches that the at least one raised element extends around an entire extent of the periphery of the support surface (Paragraph 0077).

Referring to claim 6, Tischler teaches that the retention system comprises at least one access element (Paragraphs 0060-0061).

Referring to claim 7, Tischler teaches that the at least one access element facilitates removal of the at least one substrate from a receptacle formed by the support surface and the at least one raised element of the retention system (Paragraphs 0060-0061 and Figure 4).

Referring to claim 8, Tischler teaches that the at least one access element comprises at least one recess in at least an interior portion of the at least one raised element (Paragraph 0064).

Referring to claim 9, Tischler teaches that the at least one raised element is secured to the support surface adjacent to the periphery thereof (Figure 4).

Referring to claim 35, Tischler teaches an ejection element (Paragraph 0060).

Referring to claim 36, Tischler teaches the ejection element is configured to facilitate removal of the at least one substrate from the retention component (Paragraph 0060).

Referring to claim 43, Tischler teaches that the retention element includes: a locking ring including a side wall configured to surround at least a portion of a periphery of the at least one substrate upon positioning of the at least one substrate on the support surface (Figure 4).

***Claim Rejections - 35 USC § 103***

5) The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6) Claims 2 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tischler, further in view of Zhang (U.S. Pat 6,158,346).

Referring to claim 2, Tischler teaches the above. However, Tischler does not explicitly teach a selective material consolidation system configured to form the object.

Zhang teaches a method for supporting a substrate during programmed material consolidation whereby the substrate is held on a support surface while objects are being fabricated on the substrate by programmed material consolidation (col. 5 lines 5-32).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a selective material consolidation system configured to form the object in the invention taught above since this would allow for high speed, direct layer-by-layer deposition of heterogeneous functional gradient parts (Zhang, col. 6 lines 28-30), which would enable construction of three dimensional objects (Zhang, col. 2 lines 4-6).

Referring to claim 57, Tischler teaches a programmable material consolidation apparatus, comprising: a support surface configured to receive at least one substrate on which objects are to be formed, and an ejection element associated with the support surface for facilitating removal of the at least one substrate from the support surface following the formation (Paragraph 0032 and

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Paragraph 0039 and Paragraph 0065). However, Tischler does not explicitly teach a selective material consolidation system directed toward the support surface for effecting programmed consolidation to form at least one object on or adjacent to the at least one substrate.

Zhang teaches a method for supporting a substrate during programmed material consolidation whereby the substrate is held on a support surface while objects are being fabricated on the substrate by programmed material consolidation (col. 5 lines 5-32).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to maintain the substrate on a support while one or more objects are being fabricated on the substrate by a programmed material consolidation process in the invention taught above since this would allow for high speed, direct layer-by-layer deposition of heterogeneous functional gradient parts (Zhang, col. 6 lines 28-30), which would enable construction of three dimensional objects (Zhang, col. 2 lines 4-6).

7) Claims 10-11 and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tischler, further in view of Jensen, Jr. et al (U.S. PGPUB 2001/0032111).

Referring to claims 10-11, Tischler teaches the above. However, Tischler does not explicitly teach that the at least one raised element comprises cured photopolymer, nor that the raised element comprises a plurality of at least partially superimposed, contiguous, mutually adhered layers.

Jensen teaches a programmable material consolidation apparatus which builds a carrier including a raised element out of cured photopolymer comprising mutually adhered layers (Paragraphs 0039 and 0042).

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Therefore, it would have been obvious to one skilled in the art at the time the invention was made to create a raised element out of cured photopolymer in the invention taught above since this would allow a carrier to be custom fabricated with a perimeter to restrict lateral movement of a substrate (Jensen, Paragraph 0042).

Referring to claims 40-42, see rejection of claims 27-32 and 34 below.

8) Claims 12-13, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tischler, further in view of Huang (U.S. PGPUB 2003/0173713).

Referring to claims 12-13 and 17, Tischler teaches the above. However, Tischler does not explicitly teach a planarization element configured to be drawn across a surface of unconsolidated material located over at least a portion of the at least one substrate and within an interior of a periphery defined by the at least one raised element, nor that the at least one raised element is configured to substantially confine a volume of unconsolidated material within the interior of the periphery defined thereby, nor that an upper surface of the at least one raised element defines a level at which the planarizing element is translated across the surface of the unconsolidated material.

Huang teaches a method of stereolithography whereby a substrate is filled with unconsolidated material and whereby a wiping blade is used to planarize the surface of the material (Paragraph 0004).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize confine a volume of unconsolidated material within the interior of a periphery of a substrate and to planarize the surface in the invention taught above since this

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process can be repeated and utilized to create a plastic article having dimensions and shape of a desired 3-D object to be produced (Huang, Paragraph 0004, whereby a wiping blade would need to translated at the level of a raised element in order to avoid impact with the support structure).

9) Claims 20-26, 37-39, and 44-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tischler, further in view of Cheng (U.S. Pat 5,304,248).

Referring to claims 20-21, Tischler teaches the above. However, Tischler does not explicitly teach that the retention system comprises at least one alignment feature, nor that the at least one alignment feature engages or abuts a corresponding feature of the at least one substrate.

Cheng teaches a programmable substrate deposition system which utilizes a retention system comprising an alignment feature which abuts a feature of the substrate (col. 6 lines 37-56 and Figure 4).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize an alignment feature in the retention system of the invention taught above since this would allow a shield ring to be moved back into rotational alignment with support means if it is misaligned, therefore allowing the flat portion to maintain the same orientation (Cheng, col. 6 lines 50-56).

Referring to claims 22-26, Tischler teaches the above. However, Tischler does not explicitly teach that the retention system includes at least one sealing element at the support surface thereof, that the sealing element is positioned to underlie at least a periphery of the at least one substrate, that the sealing element comprises an annular member, that the sealing element is configured to prevent unconsolidated material from contacting a lower surface of the



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at least one substrate when the at least one substrate is positioned over the support surface, nor that the sealing element comprises a compressible, resilient member.

Cheng teaches a programmable substrate deposition system which comprises a retention element including a sealing element in an annular shape that underlies a periphery of the substrate and may be made of a compressible member to prevent dispensed material from contacting the underside of the substrate (col. 5 lines 3-55 and Figure 5).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a sealing element to prevent material from contacting the backside of the substrate in the invention taught above since this would provide a simplified seal ring which would engage a semiconductor wafer to protect the edges and backside of the wafer from undesirable depositions on such surfaces of the wafer (Cheng, col. 2 lines 10-14).

Referring to claims 37-39, Tischler teaches the above. However, Tischler does not explicitly teach that the ejection element is configured to break a seal between the at least one substrate and the support surface, that the ejection element includes: at least one recess formed in the support surface; at least one piston configured to be retained within the recess; and at least one actuator associated with the at least one piston so as to cause at least a portion of the at least one piston to exit the at least one recess and to protrude from the support surface, nor at least one control element in communication with the at least one actuator of the ejection element.

Cheng teaches a system which utilizes an ejection element to break a seal between substrate and support surface whereby a vertically moveable hydraulic member may be utilized to move the substrate (col. 4 lines 29-44 and col. 5 lines 29-55 and Figure 2, whereby a piston is

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considered a type of hydraulic member and whereby a control element would inherently be utilized).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a piston to break a seal between a support and a substrate in the system taught above since this would allow a wafer to be moved vertically to and from a processing position where material may be deposited onto the wafer (Cheng, col. 4 lines 29-44).

Referring to claims 44-45, Tischler teaches the above. However, Tischler does not explicitly teach that the locking ring includes a lip which extends laterally and inwardly from an upper end of the side wall thereof, nor that the lip is configured to cover at least a peripheral portion of a surface of the at least one substrate.

Cheng teaches a locking ring including a lip which covers a portion of a substrate (Figure 2).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a locking ring including a lip which covers a substrate in the invention taught above since this lip would be sufficient to provide a seal between the backside of a wafer and a process gas (Cheng, col. 5 lines 29-55).

10) Claims 27-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tischler, further in view of Chang, further in view of Jensen.

Referring to claims 27-32 and 34, Tischler teaches the above. However, Tischler does not explicitly teach that the retention system further includes at least one pressure port formed in the support surface and located within an interior defined by the at least one sealing element, a

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pressure source in communication with the at least one pressure port, that the one pressure source comprises a negative pressure source, an ejection element which also includes the at least one pressure port, that the pressure source comprises a positive pressure source, nor that the pressure port is configured and oriented to facilitate a circulating air flow over support surface, nor at least one control element for controlling at least one of operation of the at least one pressure source and communication between the at least one pressure source and the at least one pressure port of the retention element.

Jensen teaches the use of a pressure port in the support surface which utilizes positive and negative pressures to hold the substrate and eject the substrate (Paragraph 0042, whereby a pressure source would be necessary to feed a pressure port and whereby air pressure within a confined space would create a circulating air flow and whereby a control element would inherently be utilized).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a pressure port comprising positive and negative pressure in the invention above since uniformly distributed vacuum pressure would allow a wafer to be held in a carrier and since changing the pressure exerted on the wafer would assist in removal of the wafer from the carrier (Jensen, Paragraph 0042).

Referring to claim 33, Tischler teaches that an ejection element is configured to facilitate grasping of the at least one substrate positioned over the support surface (Paragraph 0060).

11) Claims 58-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tischler, further in view of Zhang, further in view of Cheng.

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Referring to claim 58, see rejection of claims 22-26 above.

Referring to claims 59-60, see rejection of claims 37-39 above.

12) Claims 61-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tischler, further in view of Zhang, further in view of Jensen.

Referring to claims 61-63, see rejection of claims 27-32 and 34 above.

13) Claims 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tischler, further in view of Huang, further in view of Penn (U.S. Pat 6,169,605).

Referring to claims 18-19, Tischler and Huang teaches the above. However, they do not explicitly teach that the planarization element comprises a meniscus blade or an air knife.

Penn teaches a 3D model making system which utilizes a knife for planarization (col. 14 lines 24-25, whereby a meniscus blade and air knife are considered variations of a standard knife).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize an air knife or meniscus blade to planarize in the invention taught above since planarization by a knife would reduce the amount of residue generated and decrease the degree of further processing required (Penn, col. 5 lines 10-18).

14) Claims 50-51 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tischler, further in view of Cheng, further in view of Huang.

Referring to claims 50-51, see rejection of claims 12-13 and 17 above.

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Referring to claim 54, see rejection of claims 12-13 and 17 above.

15) Claims 55-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tischler, further in view of Cheng, further in view of Huang, further in view of Penn.

Referring to claims 55-56, see rejection of claims 18-19 above.

***Conclusion***

16) The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hug et al (U.S. Pat 5,558,884) – teaches a system for solidifying structures with light.

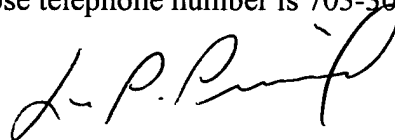
White et al (U.S. Pat 6,463,349) – teaches an ultrasonic object consolidation system.

17) Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander J Kosowski whose telephone number is 571-272-3744. The examiner can normally be reached on Monday through Friday, alternating Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Picard can be reached on 571-272-3749. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. In addition, the examiner's RightFAX number is 571-273-3744.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Alexander J. Kosowski  
Patent Examiner  
Art Unit 2125



**LEO PICARD**  
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